WHAT IS CLAIMED IS:

1. A method for synchronizing an operating characteristic of a tunable device with the wavelength of a local oscillator signal comprising:

    sweeping the wavelength of said local oscillator signal across a range of wavelengths;

    generating a synchronization signal as said local oscillator signal is swept across said range of wavelengths; and

    adjusting the operating characteristic of a tunable device in response to said synchronization signal.

2. The method of claim 1 including an initial step of setting the operating characteristic of said tunable device and the wavelength of said local oscillator signal to match each other before the wavelength of said local oscillator signal is swept across a range of wavelengths.

3. The method of claim 1 wherein generating said synchronization signal involves generating said synchronization signal in response to wavelength information that is related to said local oscillator signal.

4. The method of claim 1 wherein generating said synchronization signal involves generating said synchronization signal in response to wavelength information that is obtained by measuring said local oscillator signal.

5. The method of claim 1 wherein N discrete synchronization signals are generated at wavelength-dependent intervals.

6. The method of claim 5 wherein said wavelength-dependent intervals are defined by $(\text{wavelength}_2 - \text{wavelength}_1)/N$.

7. The method of claim 5 wherein adjusting the operating characteristic of said tunable device involves adjusting the operating characteristic in response to said N discrete synchronization signals.

8. The method of claim 1 wherein said tunable device is one of a tunable optical filter, a tunable laser, and a tunable optical detector.

9. A system for synchronizing an operating characteristic of a tunable device with the wavelength of a local oscillator signal comprising:

a tunable device having an output characteristic that is tunable; and

a device controller in optical communication with a local oscillator source and in drive signal communication with said tunable device, said device controller being configured to generate a synchronization signal as said local oscillator signal is swept across a range of wavelengths and to generate a drive signal, which sets the operating characteristic of said tunable device, in response to said synchronization signal.

10. The system of claim 9 wherein the operating characteristic of said tunable device and the wavelength of said local oscillator signal are initially set to match each other.

11. The system of claim 9 wherein said tunable device exhibits a repeatable relationship between its operating characteristic and an applied drive signal.

12. The system of claim 11 wherein said tunable device is an acousto-optic tunable filter.

13. The system of claim 9 wherein said device controller includes a wavemeter, in optical communication with said local oscillator signal, which generates wavelength information related to said swept local oscillator signal.

14. The system of claim 13 wherein said synchronization signals are generated in response to said wavelength information.

15. The system of claim 14 wherein said device controller further includes a fringe counter connected to receive said wavelength information from said wavemeter and to generate discrete synchronization signals in response to said wavelength information and a drive signal generator connected to receive said discrete synchronization signals from said fringe counter and to generate drive signals in response to said discrete synchronization signals.

16. The system of claim 14 wherein said device controller further includes a microprocessor connected to receive said wavelength information from said wavemeter and to generate drive signals in response to said wavelength information.

17. The system of claim 9 wherein N discrete synchronization signals are generated at wavelength-dependent intervals.

18. The system of claim 17 wherein adjusting the operating characteristic involves adjusting the operating characteristic in response to said N discrete synchronization signals.

19. A method for monitoring an optical signal utilizing optical heterodyne detection, the method comprising:

combining an input signal with a local oscillator signal to generate a combined optical signal;

outputting said combined optical signal;

generating an electrical signal in response to said combined optical signal;

processing said electrical signal to determine an optical characteristic of said input signal;

filtering one of said combined optical signal, said input signal, and said local oscillator signal to pass a wavelength band that tracks the wavelength of said local oscillator signal as said local oscillator signal is swept across a range of wavelengths;

generating a synchronization signal as said local oscillator signal is swept across said range of wavelengths; and

adjusting said filtering in response to said synchronization signal, said filtering being adjusted to track the frequency of said local oscillator signal.

20. The method of claim 19 including an initial step of setting the filter wavelength of an optical pre-selector and the wavelength of said local oscillator signal to match each other before the wavelength of said local oscillator signal is swept across said range of wavelengths and wherein generating said synchronization signal involves generating said synchronization signal in response to wavelength information that is related to said local oscillator signal.

21. A system for optical heterodyne detection comprising:

a first optical path for carrying an input signal;

a second optical path for carrying a local oscillator signal;

optical combining unit, in optical communication with said first and second optical paths, which combines said input signal and said local oscillator signal into a combined optical signal;

a third optical path, in optical communication with said optical combining unit, which carries said combined optical signal;

a photodetector, in optical communication with said third optical path, which receives said combined optical signal from said third optical path;

an optical pre-selector that is optically arranged to filter an optical signal within one of said first, second, and third optical paths, said optical pre-selector having a filter wavelength; and

a pre-selector controller, in drive signal communication with said optical pre-selector, which generates a synchronization signal as said local oscillator signal is swept across said range of wavelengths and which generates a drive signal for said optical pre-selector in response to said synchronization signal.

22. The system of claim 21 wherein the filter wavelength of said optical pre-selector and the wavelength of said local oscillator signal are initially set to match each other and wherein said optical pre-selector exhibits a repeatable relationship between its filter wavelength and an applied drive signal.